

## ABSTRACT OF THE DISCLOSURE

Disclosed are novel synthetically-modified *B. thuringiensis* nucleic acid segments encoding  $\delta$ -endotoxins having insecticidal activity against lepidopteran insects. Also disclosed are synthetic crystal proteins encoded by these novel nucleic acid sequences.

5 Methods of making and using these genes and proteins are disclosed as well as methods for the recombinant expression, and transformation of suitable host cells. Transformed host cells and transgenic plants expressing the modified endotoxin are also aspects of the invention. Also disclosed are methods for modifying, altering, and mutagenizing specific loop regions between the  $\alpha$  helices in domain 1 of these crystal proteins, including

10 Cry1C, to produce genetically-engineered recombinant *cry\** genes, and the proteins they encode which have improved insecticidal activity. In preferred embodiments, novel Cry1C\* amino acid segments and the modified *cry1C\** nucleic acid sequences which encode them are disclosed.

00021354-000000000000